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(54) **SYSTEM AND METHOD FOR DISPLAY OF INFORMATION USING A VEHICLE-MOUNT COMPUTER**

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(52) **U.S. Cl.**  
CPC ..... **B60R 1/00** (2013.01); **B60K 2350/1028** (2013.01); **B60K 37/06** (2013.01)

(57) **ABSTRACT**

(58) **Field of Classification Search**  
None  
See application file for complete search history.

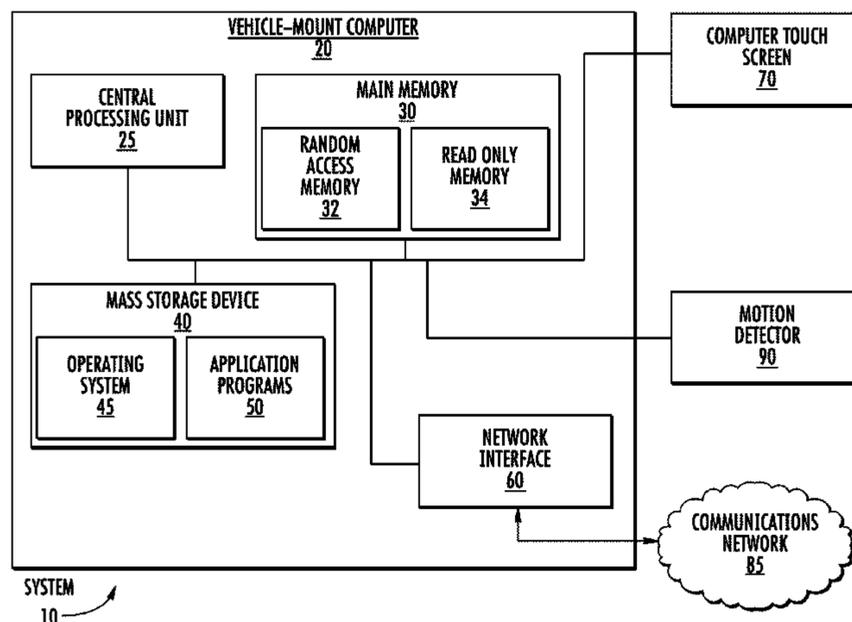
A system and method display information using a vehicle-mount computer. The system includes: (i) a computer touch screen for inputting and displaying information; (ii) a motion detector for detecting vehicle motion; and (iii) a vehicle-mount computer in communication with the computer touch screen and the motion detector. The vehicle-mount computer includes a central processing unit and memory. The vehicle-mount computer's central processing unit is configured to store information associated with user-selected information from the computer touch screen. Further, the vehicle-mount computer's central processing unit is configured to receive vehicle-motion information from the motion detector. Moreover, the vehicle-mount computer's central processing unit is configured to control the display of a zoomed view of the user-selected information on the computer touch screen in response to the motion detector's detection of motion.

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**15 Claims, 3 Drawing Sheets**



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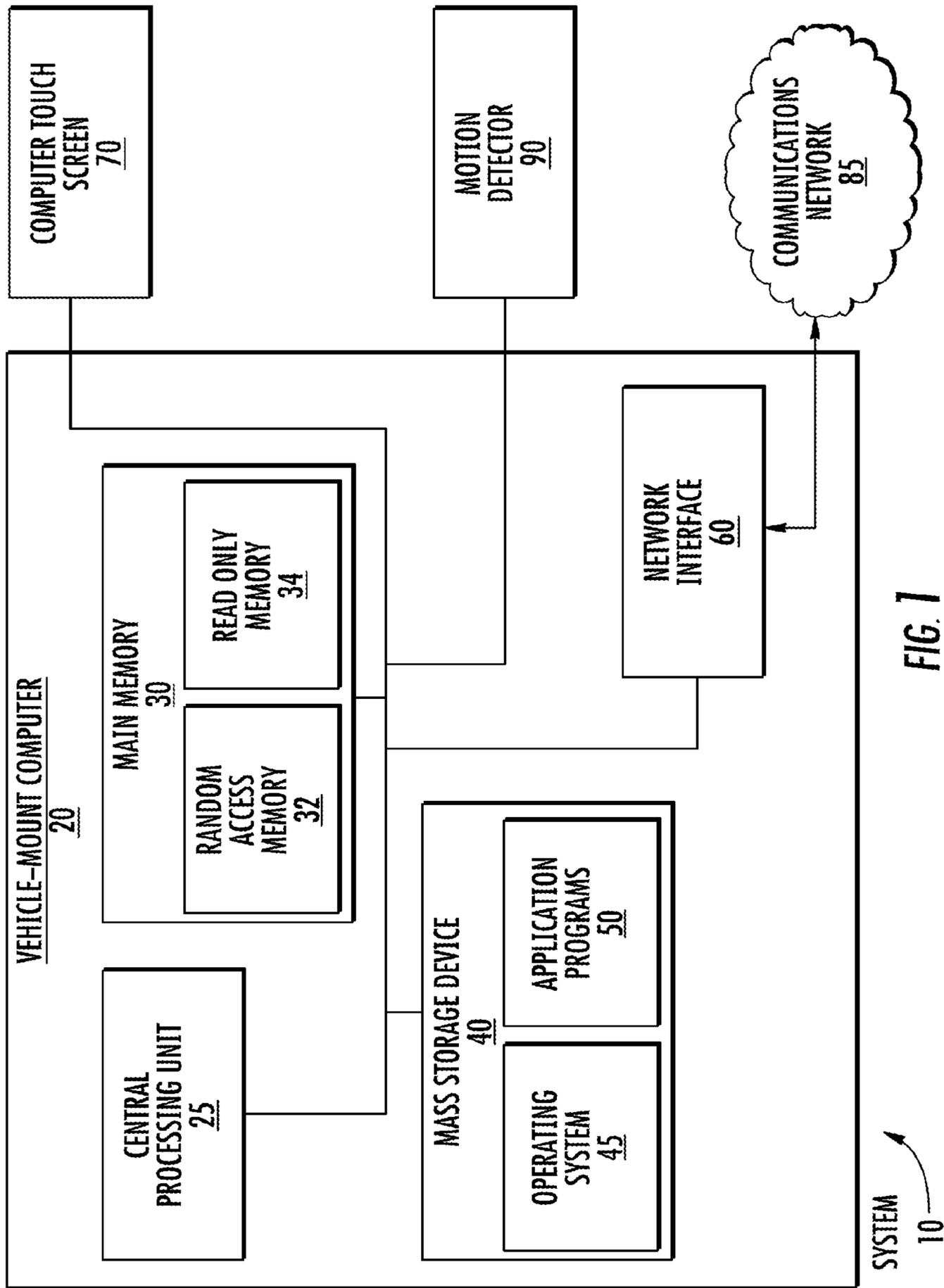


FIG. 1

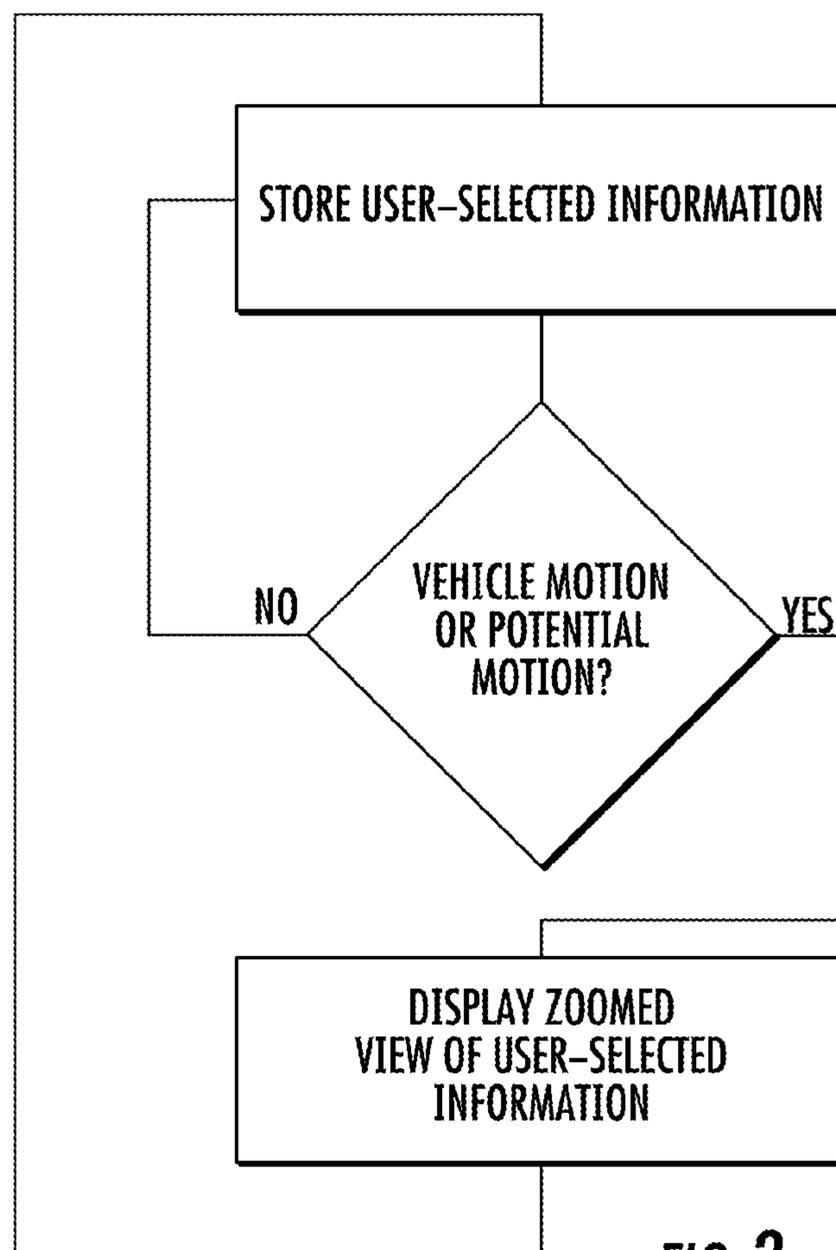
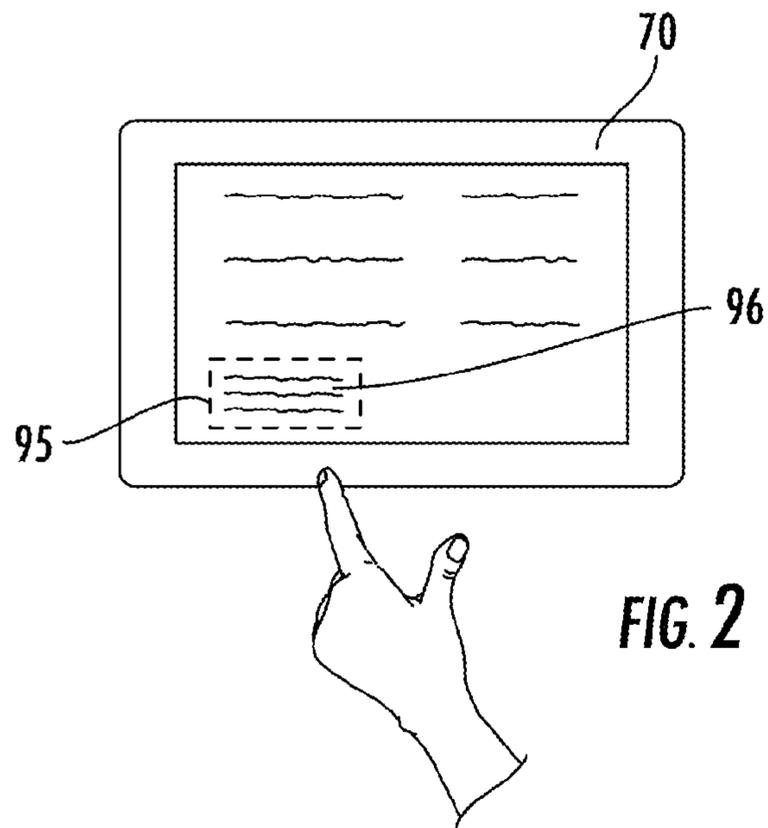


FIG. 3

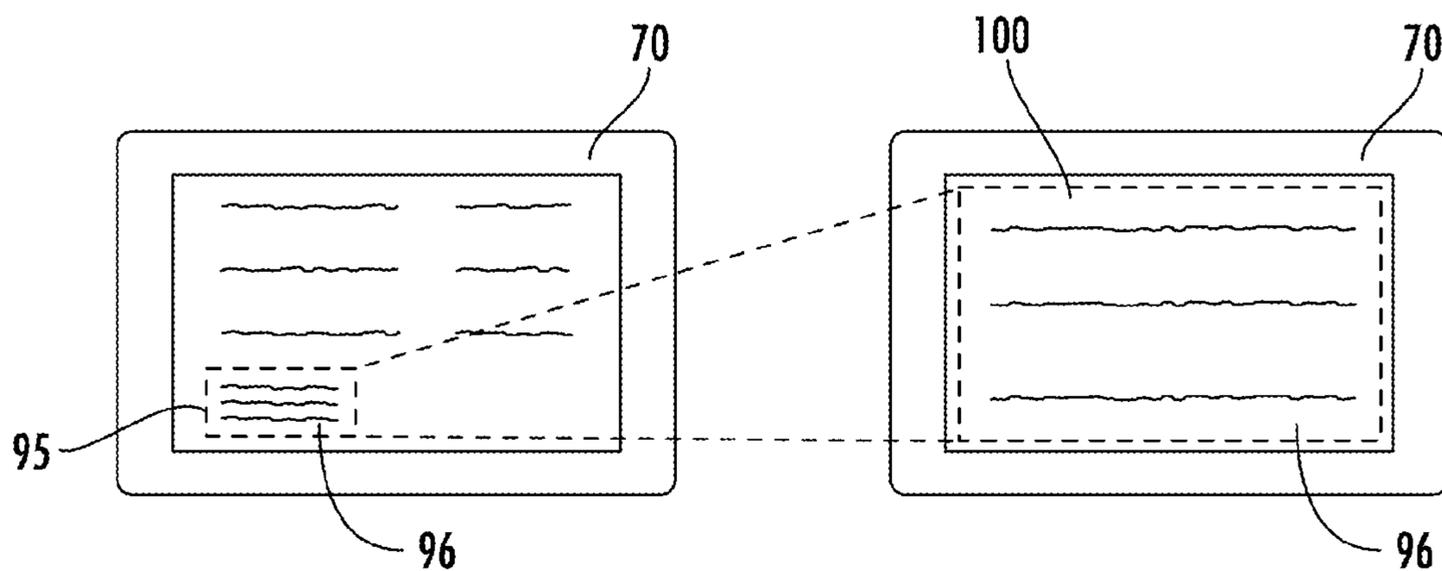


FIG. 4

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## SYSTEM AND METHOD FOR DISPLAY OF INFORMATION USING A VEHICLE-MOUNT COMPUTER

### FIELD OF THE INVENTION

The present invention relates generally to computer systems, and, more specifically, to systems and methods for displaying information using a vehicle-mount computer during vehicle motion.

### BACKGROUND

Businesses have achieved greater productivity in recent years by deploying mobile computing devices into the field to assist workers. For example, workers use vehicle-mount computers to display important information in the field. Vehicle-mount computers are computing devices that are specially designed to mount to a vehicle and be used by the vehicle operator. For instance, several types of vehicle-mount computers are available for installation and use in commercial vehicles including forklifts, warehouse vehicles, and delivery trucks and vans.

Vehicle-mount computer systems typically utilize a screen for displaying information to a vehicle operator or other occupant. The computer system may incorporate a touch screen, or other input device, so that the user can select desired information for display. A forklift operator may, for example, view inventory information, delivery location information, and delivery navigation information directly from the cabin of the forklift using a vehicle-mount computer. The various types of user-selected information may be displayed either individually on the full area of a vehicle-mount computer screen or simultaneously on the computer screen using split-screen or otherwise partitioned views.

Although businesses have effectively employed vehicle-mount computers to increase worker productivity and improve the inbound, internal, and outbound flow of resources, challenges exist relating to the display of information on vehicle-mount computer screens when a vehicle is in motion. When a vehicle is in motion, the information displayed must be easily read by the vehicle operator at a glance and, therefore, difficulties can result when multiple types of information are displayed simultaneously. Moreover, when in motion the operator may prefer that only certain information be displayed on the vehicle-mount computer such as, for example, navigation information or other information associated with a delivery or pick-up. Although a vehicle operator could potentially manually configure a vehicle-mount computer to display the desired information prior to placing the vehicle in motion, this is inefficient, particularly for vehicles that are continually picking up and delivering multiple items.

Therefore, a need exists for improved systems and methods for displaying information using a vehicle-mount computer so that information of interest selected by a driver will be automatically displayed during vehicle motion. More particularly, there exists a need for a system to obtain and store user-selected information on a vehicle-mount computer screen and automatically provide an easily-readable, zoomed view of the selected information when the vehicle is in motion.

### SUMMARY

Accordingly, in one aspect, the present invention embraces a system for displaying information using a vehicle-mount computer, including a computer touch screen for inputting

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and displaying information, a motion detector for detecting vehicle motion, and a vehicle-mount computer in communication with the computer touch screen and the motion detector, the vehicle-mount computer including a central processing unit and memory. The vehicle-mount computer's central processing unit is configured to store information associated with user selected information from the computer touch screen, receive vehicle-motion information from the motion detector, and control the display of user-selected information on the computer touch screen in response to the motion detector's detection of motion.

In an exemplary embodiment, the user-selected information is within a user-selected area on the computer touch screen.

In another exemplary embodiment, the user-selected area is a rectangle.

In yet another exemplary embodiment, in response to the motion detector's detection of vehicle motion the vehicle-mount computer's central processing unit controls the display such that the aspect ratio of the user-selected area on the computer touch screen corresponds to the aspect ratio of the computer touch screen.

In yet another exemplary embodiment, the user-selected area is selected by a user on the computer touch screen.

In yet another exemplary embodiment, the configuration of the user-selected area is predetermined by the vehicle-mount computer.

In yet another exemplary embodiment, the vehicle-mount computer includes a network interface.

In yet another exemplary embodiment, the motion detector includes an accelerometer, a gps locator, a gyroscope, and/or a compass.

In yet another exemplary embodiment, the central processing unit is configured to execute application programs.

In yet another exemplary embodiment, the user-selected information displayed on the computer touch screen covers at least about 50% of the display area of the computer touch screen.

In yet another exemplary embodiment, the user-selected information includes navigation information.

In yet another exemplary embodiment, the user-selected information includes delivery information.

In yet another exemplary embodiment, the vehicle-mount computer's central processing unit is configured to continually determine whether the vehicle is in motion.

In yet another exemplary embodiment, the vehicle-mount computer's central processing unit displays the full amount of information from the computer touch screen if the motion detector indicates that the vehicle is not in motion.

In another aspect, the present invention embraces a method for displaying information using a vehicle-mount computer including selecting information on a computer touch screen of the vehicle-mount computer, monitoring vehicle motion with a motion detector, and after detecting vehicle motion, displaying a zoomed view of the user-selected information on the computer touch screen display.

In an exemplary embodiment, the user-selected information is within a user-selected area on the computer touch screen.

In another exemplary embodiment, the aspect ratio of the zoomed view of the user-selected area on the computer touch screen corresponds to the aspect ratio of the computer touch screen.

In yet another exemplary embodiment, the motion detector includes an accelerometer, a gps locator, a gyroscope, and/or compass.

In yet another exemplary embodiment, the configuration of the user-selected area is predetermined by the vehicle-mount computer.

In yet another aspect, the present invention embraces a method for displaying data using a vehicle-mount computer including selecting an area on a computer touch screen of the vehicle-mount computer, storing the selected area, monitoring vehicle motion with a motion detector, and after detecting vehicle motion, displaying information associated with the selected area on the computer touch screen when the vehicle is moving.

The foregoing, as well as other objectives and advantages of the invention, and the manner in which the same are accomplished, are further specified within the following detailed description and its accompanying drawings.

### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic block diagram illustrating components for an exemplary system for displaying information using a vehicle-mount computer according to the present invention.

FIG. 2 illustrates an exemplary user-selected area and user-selected information from a computer touch screen according to the present invention.

FIG. 3 illustrates the communication of certain elements of the exemplary embodiment for using a vehicle-mount computer according to the present invention.

FIG. 4 depicts an exemplary user-selected area according to the present invention being displayed in a zoomed view on the vehicle-mount computer during vehicle motion or potential vehicle motion.

### DETAILED DESCRIPTION

The present invention embraces systems and methods for displaying information. In particular, the present invention embraces systems and methods for displaying information using a vehicle-mount computer during vehicle motion.

In an exemplary embodiment, the system for displaying information using a vehicle-mount computer according to the present invention may include a vehicle-mount computer having a central processing unit, a system bus, a main memory, a mass storage device, an operating system stored on the mass storage device and executed by the central processing unit, and a computer touch screen for receiving input from a user and displaying information. The components of the vehicle-mount computer may be connected and in communication with each other by way of the system bus. The exemplary system also includes a motion detector connected to and in communication with the vehicle-mount computer.

In another exemplary embodiment, the method for displaying information using a vehicle-mount computer according to the present invention includes providing a vehicle-mount computer having a central processing unit, a system bus, a main memory, a mass storage device, an operating system stored on the mass storage device and executed by the central processing unit, and a computer touch screen for receiving input from a user and displaying information. The exemplary method according to the present invention further includes the steps of connecting a motion detector to the vehicle-mount computer and, upon the motion detector's detection of vehicle motion; the vehicle-mount computer's central processing unit displays a zoomed view of user-selected information on the computer touch screen.

Non-limiting examples of typical vehicles that may employ the system and method for displaying information

using a vehicle-mount computer according to the present invention include forklifts, cranes, delivery truck, and similar industrial vehicles (e.g., vehicles used in industrial operations, factory or warehouse settings, and the like). References in the disclosure to particular types of vehicles are not intended to limit the disclosure to particular vehicles.

Referring now to the drawings, FIG. 1 is a schematic block diagram illustrating components of an exemplary system 10 for displaying information using a vehicle-mount computer. Vehicle-mount computer 20 includes a mass storage device 40 for storing an operating system 45 and various application programs 50. The mass storage device 40 may store other types of information as well.

As illustrated in FIG. 1, operating system 45 of the exemplary embodiment consists of software that controls the overall operation of the vehicle-mount computer 20, including process scheduling and management, process protection, and memory management. Examples of suitable operating systems include, but are not limited to, WINDOWS® 7 and WINDOWS® EMBEDDED COMPACT (i.e., WINDOWS® CE) from MICROSOFT® CORPORATION of Redmond, Wash., and the LINUX® open source operating system. Typically, operating system 45 is loaded by booting the vehicle-mount computer 20 and is executed directly by the central processing unit 25.

Application programs 50 (FIG. 1) include any number of executable software programs designed to assist the vehicle operator in the performance of specific tasks. Application programs 50 may load automatically upon execution of operating system 45 or in response to an input from the vehicle operator.

Main memory 30 (FIG. 1) provides for storage of instructions and information directly accessible by central processing unit 25. Main memory 30 may be configured to include random-access memory 32 (RAM) and read-only memory 34 (ROM). The ROM 34 may permanently store firmware or a basic input/output system (BIOS), which provides first instructions to vehicle-mount computer 20 when it is booted. RAM 32 may serve as temporary and immediately accessible storage for operating system 45 and application programs 50.

Mass storage device 40 (FIG. 1) may be any of the various types of computer components capable of storing large amounts of data in a persisting (i.e., non-volatile) and machine-readable manner. Typically, mass storage device 40 may be a hard disk drive. Alternatively, mass storage device 40 may be a solid state drive, optical drive, removable flash drive or any other component with similar storage capabilities.

As illustrated in FIG. 1, computer touch screen 70 may be provided for inputting and displaying information using vehicle-mount computer 20. Computer touch screen 70 is operably connected to, and in communication with, vehicle-mount computer 20. Touch screen 70 may display information to users in the form of text or graphical output generated by vehicle-mount computer 20. Persons having skill in the art will appreciate that computer touch screen 70 may incorporate any appropriate touch screen technology having the ability to sense touch (e.g., resistive, capacitive, etc.) and that is conducive to the operating environment of the vehicle. Although touch screen 70 is illustrated in FIG. 1, other input devices (e.g., keyboard or mouse) or display devices may be utilized in connection with vehicle-mount computer 20.

As depicted in FIG. 1, an exemplary embodiment of the vehicle-mount computer 20 of the system 10 for displaying information using a vehicle-mount computer may also include network interface 60. Network interface 60 is operably connected to communications network 85, enabling

vehicle-mount computer **20** to communicate with communications network **85**. Communications network **65** may include any collection of computers or communication devices interconnected by communication channels. The communication channels may be wired or wireless. Examples of such communication networks include, without limitation, local area networks, the Internet, and cellular networks. The connection to the communications network **85** allows vehicle-mount computer **20** to communicate with other network nodes. For example, a central dispatcher could send instructions (e.g., a delivery schedule) from a scheduling server to the vehicle operator via the communications network **85**.

Motion detector **90** (FIG. 1) may include any number of sensors or other appropriate devices that detect vehicle movement or potential vehicle movement. Motion detector **90** is operably connected to and in communication with vehicle-mount computer **20**. Those having skill in the art will appreciate that any of a number of sensors may be utilized to detect vehicle movement including, but not limited to, an accelerometer, a gps locator, gyroscope, compass, or some appropriate combination of a number of sensors or devices. Sensors could also monitor potential vehicle movement, such as when the vehicle is placed into gear or otherwise made ready for movement by the user. As the term is used herein, vehicle motion specifically embraces the concept of actual motion as well as potential motion.

Central processing unit **25** is configured to store user-selected information from the computer touch screen **70**. As illustrated in the exemplary embodiment (FIG. 1), the central processing unit **25** may execute application programs **50** to at least temporarily store information relating to a user-selected area, such as a rectangle, input from computer touch screen **70**.

As illustrated in FIG. 2, the vehicle-mount computer's **20** central processing unit **25**, along with other components of system **10** such as application programs **50**, may be configured to store user-selected information **96** associated with a user-selected area **95** from computer touch screen **70**. Although the user-selected area **95** as depicted in FIG. 2 consists of a rectangle, the user-selected area **95** could consist of any configuration.

FIG. 3 illustrates how certain of the above-described elements of the exemplary embodiment for displaying information using a vehicle-mount computer may communicate in order to display user-selected information. As set forth above, the vehicle-mount computer's **20** central processing unit **25** is configured to receive vehicle-motion information from motion detector **90**. The vehicle-mount computer's **20** central processing unit **25** is configured to control the storage and display of a zoomed view **100** (FIG. 4) of the user-selected information **96** on the computer touch screen **70** in response to the motion detector's **70** detection of vehicle motion.

As illustrated in FIG. 4, the user-selected information **96** may include information on the computer touch screen **70** that the vehicle operator prefers to be displayed in a zoomed view **100** on the vehicle-mount computer **20** during vehicle motion. Such information may include, but is not limited to, navigation information, pick-up information related to an item, or other information related to a scheduled delivery. As set forth in FIG. 4 and described above, the user-selected information **96** within user-selected area **95** will be automatically displayed on the computer touch screen **70** during vehicle motion. More particularly, the user-selected information **96** will be automatically displayed in a zoomed view **100** (i.e., a magnified view) on the vehicle-mount computer **20**

such that the user-selected information **96** is provided in a more easily-readable format when the vehicle is in motion.

In a non-limiting embodiment, the rectangle or other outline utilized for the user-selected area **95** may be configured such that the user-selected area **95** on the computer touch screen **70** corresponds to the aspect ratio of the computer touch screen **90** in order to facilitate display of the zoomed view **100**.

To supplement the present disclosure, this application incorporates entirely by reference the following patents, patent application publications, and patent applications: U.S. Pat. Nos. 6,832,725; 7,159,783; 7,413,127; 8,390,909; 8,294,969; 8,408,469; 8,408,468; 8,381,979; 8,408,464; 8,317,105; 8,366,005; 8,424,768; 8,322,622; 8,371,507; 8,376,233; 8,457,013; 8,448,863; U.S. Patent Application Publication No. 2012/0111946; U.S. Patent Application Publication No. 2012/0223141; U.S. Patent Application Publication No. 2012/0193423; U.S. Patent Application Publication No. 2012/0203647; U.S. Patent Application Publication No. 2012/0248188; U.S. Patent Application Publication No. 2012/0228382; U.S. Patent Application Publication No. 2012/0193407; U.S. Patent Application Publication No. 2012/0168511; U.S. Patent Application Publication No. 2012/0168512; U.S. Patent Application Publication No. 2010/0177749; U.S. Patent Application Publication No. 2010/0177080; U.S. Patent Application Publication No. 2010/0177707; U.S. Patent Application Publication No. 2010/0177076; U.S. Patent Application Publication No. 2009/0134221; U.S. Patent Application Publication No. 2012/0318869; U.S. Patent Application Publication No. 2013/0043312; U.S. Patent Application Publication No. 2013/0068840; U.S. Patent Application Publication No. 2013/0070322; U.S. Patent Application Publication No. 2013/0075168; U.S. Patent Application Publication No. 2013/0056285; U.S. Patent Application Publication No. 2013/0075464; U.S. Patent Application Publication No. 2013/0082104; U.S. Patent Application Publication No. 2010/0225757; U.S. patent application Ser. No. 13/347,219 for an OMNIDIRECTIONAL LASER SCANNING BAR CODE SYMBOL READER GENERATING A LASER SCANNING PATTERN WITH A HIGHLY NON-UNIFORM SCAN DENSITY WITH RESPECT TO LINE ORIENTATION, filed Jan. 10, 2012 (Good); U.S. patent application Ser. No. 13/347,193 for a HYBRID-TYPE BIOPTICAL LASER SCANNING AND DIGITAL IMAGING SYSTEM EMPLOYING DIGITAL IMAGER WITH FIELD OF VIEW OVERLAPPING FIELD OF FIELD OF LASER SCANNING SUBSYSTEM, filed Jan. 10, 2012 (Kearney et al.); U.S. patent application Ser. No. 13/367,047 for LASER SCANNING MODULES EMBODYING SILICONE SCAN ELEMENT WITH TORSIONAL HINGES, filed Feb. 6, 2012 (Feng et al.); U.S. patent application Ser. No. 13/400,748 for a LASER SCANNING BAR CODE SYMBOL READING SYSTEM HAVING INTELLIGENT SCAN SWEEP ANGLE ADJUSTMENT CAPABILITIES OVER THE WORKING RANGE OF THE SYSTEM FOR OPTIMIZED BAR CODE SYMBOL READING PERFORMANCE, filed Feb. 21, 2012 (Wilz); U.S. patent application Ser. No. 13/432,197 for a LASER SCANNING SYSTEM USING LASER BEAM SOURCES FOR PRODUCING LONG AND SHORT WAVELENGTHS IN COMBINATION WITH BEAM-WAIST EXTENDING OPTICS TO EXTEND THE DEPTH OF FIELD THEREOF WHILE RESOLVING HIGH RESOLUTION BAR CODE SYMBOLS HAVING MINIMUM CODE ELEMENT WIDTHS, filed Mar. 28, 2012 (Havens et al.); U.S. patent application Ser. No. 13/492,883 for a LASER SCANNING MODULE

WITH ROTATABLY ADJUSTABLE LASER SCANNING ASSEMBLY, filed Jun. 10, 2012 (Hennick et al.); U.S. patent application Ser. No. 13/367,978 for a LASER SCANNING MODULE EMPLOYING AN ELASTOMERIC U-HINGE BASED LASER SCANNING ASSEMBLY, filed Feb. 7, 2012 (Feng et al.); U.S. patent application Ser. No. 13/852,097 for a System and Method for Capturing and Preserving Vehicle Event Data, filed Mar. 28, 2013 (Barker et al.); U.S. patent application Ser. No. 13/780,356 for a Mobile Device Having Object-Identification Interface, filed Feb. 28, 2013 (Samek et al.); U.S. patent application Ser. No. 13/780,158 for a Distraction Avoidance System, filed Feb. 28, 2013 (Sauerwein); U.S. patent application Ser. No. 13/784,933 for an Integrated Dimensioning and Weighing System, filed Mar. 5, 2013 (McCloskey et al.); U.S. patent application Ser. No. 13/785,177 for a Dimensioning System, filed Mar. 5, 2013 (McCloskey et al.); U.S. patent application Ser. No. 13/780,196 for Android Bound Service Camera Initialization, filed Feb. 28, 2013 (Todeschini et al.); U.S. patent application Ser. No. 13/792,322 for a Replaceable Connector, filed Mar. 11, 2013 (Skvoretz); U.S. patent application Ser. No. 13/780,271 for a Vehicle Computer System with Transparent Display, filed Feb. 28, 2013 (Fitch et al.); U.S. patent application Ser. No. 13/736,139 for an Electronic Device Enclosure, filed Jan. 8, 2013 (Chaney); U.S. patent application Ser. No. 13/771,508 for an Optical Redirection Adapter, filed Feb. 20, 2013 (Anderson); U.S. patent application Ser. No. 13/750,304 for Measuring Object Dimensions Using Mobile Computer, filed Jan. 25, 2013; U.S. patent application Ser. No. 13/471,973 for Terminals and Methods for Dimensioning Objects, filed May 15, 2012; U.S. patent application Ser. No. 13/895,846 for a Method of Programming a Symbol Reading System, filed Apr. 10, 2013 (Corcoran); U.S. patent application Ser. No. 13/867,386 for a Point of Sale (POS) Based Checkout System Supporting a Customer-Transparent Two-Factor Authentication Process During Product Checkout Operations, filed Apr. 22, 2013 (Cunningham et al.); U.S. patent application Ser. No. 13/888,884 for an Indicia Reading System Employing Digital Gain Control, filed May 7, 2013 (Xian et al.); U.S. patent application Ser. No. 13/895,616 for a Laser Scanning Code Symbol Reading System Employing Multi-Channel Scan Data Signal Processing with Synchronized Digital Gain Control (SDGC) for Full Range Scanning, filed May 16, 2013 (Xian et al.); U.S. patent application Ser. No. 13/897,512 for a Laser Scanning Code Symbol Reading System Providing Improved Control over the Length and Intensity Characteristics of a Laser Scan Line Projected Therefrom Using Laser Source Blanking Control, filed May 20, 2013 (Brady et al.); and U.S. patent application Ser. No. 13/897,634 for a Laser Scanning Code Symbol Reading System Employing Programmable Decode Time-Window Filtering, filed May 20, 2013 (Wilz, Sr. et al.).

In the specification and/or figures, typical embodiments of the invention have been disclosed. The present invention is not limited to such exemplary embodiments. The use of the term “and/or” includes any and all combinations of one or more of the associated listed items. The figures are schematic representations and so are not necessarily drawn to scale. Unless otherwise noted, specific terms have been used in a generic and descriptive sense and not for purposes of limitation.

The invention claimed is:

**1.** A system for displaying information using a vehicle-mount computer, comprising:  
a computer touch screen for inputting and displaying information;  
a motion detector for detecting vehicle motion; and

a vehicle-mount computer in communication with the computer touch screen and the motion detector, the vehicle-mount computer including a central processing unit and memory;  
wherein the vehicle-mount computer's central processing unit is configured to store information associated with user-selected information from the computer touch screen;  
wherein the vehicle-mount computer's central processing unit is configured to receive vehicle-motion information from the motion detector;  
wherein the vehicle-mount computer's central processing unit is configured to control the display of user-selected information on the computer touch screen in response to the motion detector's detection of motion;  
wherein the user-selected information is within a user-selected area on the computer touch screen; and  
wherein the configuration of the user-selected area is selected by a user on the computer touch screen.

**2.** The system of claim **1**, wherein the user-selected area comprises a rectangle.

**3.** The system of claim **1**, wherein in response to the motion detector's detection of vehicle motion the vehicle-mount computer's central processing unit is configured to control the display such that the aspect ratio of the user-selected area on the computer touch screen corresponds to the aspect ratio of the computer touch screen.

**4.** The system of claim **1**, wherein the vehicle-mount computer comprises a network interface.

**5.** The system of claim **1**, wherein the motion detector comprises an accelerometer, a gps locator, a gyroscope, and/or a compass.

**6.** The system of claim **1**, wherein the central processing unit is configured to execute application programs.

**7.** The system of claim **1**, wherein the user-selected information displayed on the computer touch screen covers at least about 50% of the display area of the computer touch screen.

**8.** The system of claim **1**, wherein the user-selected information comprises navigation information.

**9.** The system of claim **1**, wherein the user-selected information comprises delivery information.

**10.** The system of claim **1**, wherein the vehicle-mount computer's central processing unit is configured to continually determine whether the vehicle is in motion.

**11.** The system of claim **1**, wherein the vehicle-mount computer's central processing unit displays the full amount of information from the computer touch screen if the motion detector indicates that the vehicle is not in motion.

**12.** A method for displaying information using a vehicle-mount computer, comprising:  
selecting information on a computer touch screen of the vehicle-mount computer;  
monitoring vehicle motion with a motion detector; and  
after detecting vehicle motion, displaying a zoomed view of the user-selected information on the computer touch screen display;  
wherein the user-selected information is within a user-selected area on the computer touch screen; and  
wherein the configuration of the user-selected area is selected by a user on the computer touch screen.

**13.** The method of claim **12**, wherein the aspect ratio of the zoomed view of the user-selected area on the computer touch screen corresponds to the aspect ratio of the computer touch screen.

**14.** The method of claim **12**, wherein the motion detector comprises an accelerometer, a gps locator, a gyroscope, and/or compass.

15. A method for displaying data using a vehicle-mount  
computer comprising:  
selecting an area on a computer touch screen of the vehicle-  
mount computer;  
after selecting the area on the computer touch screen, stor- 5  
ing the selected area;  
monitoring vehicle motion with a motion detector; and  
after detecting vehicle motion, displaying information  
associated with the selected area on the computer touch  
screen when the vehicle is moving. 10

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